

Purpose: Permanent Interstitial brachytherapy with I-125 seeds has been utilized for the treatment of early stage prostate cancer and has provided low risk of complications. The purpose of this study was to analyze the preplan and post-implant dosimetry data statistically for the I-125 prostate brachytherapy in order to confirm the accuracy and consistency of the seed implant techniques.

Method and Materials: Preplan and post-implant dosimetry were performed for 39 patients in I-125 prostate brachytherapy during last three years at Northwestern Memorial Hospital (NMH). The prostate volumes were measured using an ultrasound (US) system and the prostate contours with margins were applied for preplans. CT images were acquired within 3 days of the implant day for post-implant dosimetry. Activities between 0.31 and 0.34 mCi per seed were used for the prescription dose of 144 Gy. The relationships between the US volumes and the numbers of seeds and needles were analyzed. The V(100) and D(90) were obtained in the post-implant dosimetry.

Results: The US volume ranged from 32 cm³ to 65 cm³ (n=39). The mean numbers of seeds and needles used were 95.3, 109.0, 116.1, 130.2 and 32.0, 31.5, 32.6, 35.8 for the US volume groups of 30-39 (n=4), 40-49 (n=17), 50-59 (n=13), 60-65 cm³ (n=5), respectively. The mean V(100) and D(90) were 91.9% of the prostate volume and 105.7% of the prescription dose, respectively.

Conclusion: The prostate volume group of 40-49 cm³ (n=17) included the greatest number of patients in this study. The numbers of seeds has increased linearly as the US volume increased. The numbers of needles used were relatively consistent over the different volume groups. We demonstrated the accuracy and consistency of the I-125 prostate brachytherapy with the modern computer-based dosimetry, ultrasound system, and template-based transperineal implant techniques.